



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/730,813	12/06/2000	Toshihiro Tabuchi	0112780-017	9116

24573 7590 10/28/2004

BELL, BOYD & LLOYD, LLC
PO BOX 1135
CHICAGO, IL 60690-1135

EXAMINER

HASSANZADEH, PARVIZ

ART UNIT PAPER NUMBER

1763

DATE MAILED: 10/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/730,813

Applicant(s)

TABUCHI ET AL.

Examiner

Parviz Hassanzadeh

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3 and 5-19 is/are pending in the application.
- 4a) Of the above claim(s) 3 and 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5-12 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Response to Arguments

In view of the appeal brief filed on 9/7/04, PROSECUTION IS HEREBY REOPENED. New ground of rejections set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

- (1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,
- (2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Election/Restrictions

Applicant's election without traverse of Species 8 (at least one of the plasma nozzles is made a hollow discharge generation area), claims 1, 5-12 and 19 in Paper No. 7 is acknowledged. It is noted that claim 18 (including a magnetic field formed in the vicinity of the plasma nozzle and/or in the vicinity of the recess, through hole, and/or in the hollow inside) belongs to non-elected species 9.

Claims 3, 13-18 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species 1-7, 9-17, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 7.

Specification

Art Unit: 1763

The amendment filed 6/30/03 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the diameter W has been changed from $1\text{mm} \leq W \leq 100\text{mm}$ into $10\text{mm} < W \leq 100\text{mm}$ and the preferred value of W has changed from $1\text{mm} \leq W \leq 20\text{mm}$ into $10\text{mm} < W \leq 20\text{mm}$ in order to obviate rejection of claims under 35 U.S. C. § 102.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 5-12 and 19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The range of diameter W of nozzle is not supported by the specification *as originally filed* and the changes made to W in the specification is considered new matter.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 9, 10, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Maher et al (US Patent No. 5,248,371).

Maher et al teach a surface treatment apparatus (Fig. 9) for making raw material gas plasma by generating plasma, in a casing provided with a high density source 152 (*plasma generation means*) and a grid electrode 154 having a plurality of holes (*plasma nozzles making hollow electrode discharge generation area*), a gas injection system 164 (*raw material gas inlet*) and a substrate support electrode 156 (*substrate support table*), wherein a substrate supported on the lower electrode 156 is plasma treated with the plasma 158 formed by the high density plasma source, wherein:

the casing is defined into two chambers defined by plasma generation region 158 and plasma treatment region 160);

the substrate treatment region and the plasma generation region are connected through a perforated grid 154 having a plurality of hollow discharge generation holes (*one or more plasma nozzles*), and wherein the grid is grounded or powered; and

wherein the diameter of the holes are between 4.9-20 mm (*at least one of the plasma nozzles is made a hollow electrode discharge generation area and the opening width (W91) of the smallest portion on the plasma nozzles is set in a range satisfying $10\text{ mm} < W(1) \leq 100\text{ mm}$*).

Further regarding size of the hole: Maher et al teach a plasma processing apparatus including a grid electrode 36 (Fig. 1B, 2, aA-3D, 4, 5) or 154 (Fig. 9) having at least a hole whose size is selected to form a hollow-discharge at the hole, wherein the grid is grounded (forming an anode hollow discharge) or is powered (forming a cathode hollow discharge), and wherein the size of the hole is selected to be greater than 4.9 mm and preferably at 11 mm, depending on the gas pressure and the power, to create hollow discharge at the grid holes which enhances high-energy-density ions at the holes (column 5, line 52 through column 14, line 6).

Further regarding claim 19, bias potential: as shown in Fig. 9 of Maher et al, a controllable negative potential may be applied to the lower electrode 156 for extracting ions at certain energy levels selectively (column 13, lines 28-59).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5-8, 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maher et al (US Patent No. 5,248,371).

Maher et al teach all limitations of the claims as discussed above except for the hollow discharge hole being slit shape.

It was held in *re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) that the shape was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular shape was significant. (Also see MPEP 2144.04(d)).

Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to select the desire shape of the hollow discharge holes of the electrode grid

being cylindrical, slit or variation thereof in order to further enhance the uniformity of plasma-ion distribution over the substrate.

Claims 1, 5-12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al (US Patent No. 6,192,828 B1) in view of Maher et al (US Patent No. 5,248,371).

Takahashi et al teach a surface treatment apparatus (Fig. 1) for making raw material gas plasma by generating plasma, in a casing provided with a high frequency electrode 12 (*plasma generation electrode*) and a perforated electrode 30 (*plasma generation means*), a gas introducing pipe 26 (*raw material gas inlet*) and a base material holder 8 (*substrate support table*), by the plasma generation electrodes 12 and 30 (*plasma generation means*) and giving plasma treatment to the surface of a base material 10 (*substrate*) placed on the substrate support table 8, wherein:

the casing is defined into two chambers 24 and 22, a plasma container chamber 24 (*plasma generation chamber*) provided with the plasma generation electrodes 12, 30 (*plasma generation means*) and a film formation chamber 22 (*substrate treatment chamber*) provided with the substrate support table 8;

the substrate treatment chamber 22 and the plasma generation chamber 24 are connected through a perforated electrode 30 (*one or more plasma nozzles*) which coupled to a pulse power source 36; and

wherein the diameter of the pores are *preferably* in the range of 0.1-10 mm (*at least one of the plasma nozzles is made a hollow electrode discharge generation area*) (column 4, line 19 through column 5, line 58).

Takahashi et al fail to explicitly teach the diameter of the pores being greater than 10 mm.

Maher et al teach a plasma processing apparatus including a grid electrode 36 (Fig. 1B, 2, aA-3D, 4, 5) or 154 (Fig. 9) having at least a hole whose size is selected to form a hollow-discharge at the hole, wherein the grid is grounded (forming an anode hollow discharge) or is powered (forming a cathode hollow discharge), and wherein the size of the hole is selected to be greater than 4.9 mm and preferably at 11 mm, depending on the gas pressure and the power, to create hollow discharge at the grid holes which enhances high-energy-density ions at the holes (column 5, line 52 through column 14, line 6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the grid structure as taught by Maher et al in the apparatus of Takahashi et al in order to create ions with high energy and high density at the grid holes for performing an ion-dominant processing on the surface of a substrate.

Regarding claim 5-12, change in shape: It was held in *re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) that the shape was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular shape was significant. (Also see MPEP 2144.04(d)).

Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to select the desire shape of the plasma nozzle in order to distribute the plasma species more uniformly over the substrate.

Regarding claim 19, bias potential: as shown in Fig. 9 of Maher et al, a controllable negative potential may be applied to the lower electrode 156 for extracting ions at certain energy

Art Unit: 1763

levels selectively (column 13, lines 28-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the bias potential mechanism as taught by Maher et al in the apparatus of Takahashi et al in order to selectively extract ions towards the substrate.

Further Response to Arguments

Applicant's arguments filed 9/7/04 are not persuasive.

Appellants assert that the lower endpoint of the range of the opening width $W(1)$ of the plasma nozzle, that is, greater than 10 mm, is within the original range of 1 mm to 100 mm, and thus the new lower endpoint of the range of the opening width is supported by the application as originally filed and does not introduce new matter. Similarly, the lower endpoint of the range of the opening width $W(1)$ of the plasma nozzle as recited in claim 1, that is, greater than 10 mm, is within the original range of 1 mm to 100 mm.

Examiner present that according to the specification as originally filed, a plasma nozzle makes a hollow electrode discharge area if a plasma is formed at the nozzle. The range of the opening width $W(1)$ of the smallest portion of the nozzle required for forming a hollow electrode discharge depends on parameters such as frequency of the RF power source and the gas pressure. According to the specification, *the opening width $W(1)$ of the smallest portion of the nozzle required for or capable of forming a hollow electrode discharge can be as small as 1 mm* (page 33, line 5 through page 35, line 22, page 48, lines 1-6, page 52, line 17 through page 54, line 11, page 98, lines 2-24, and Tables 2 and 3).

Examiner argues that the lower endpoint of the range of the opening width $W(1)$ capable of forming a hollow electrode discharge was originally disclosed to be 1 mm. The application as

Art Unit: 1763

originally filed did not disclose 10 mm as the lower endpoint of the range of the opening width W(1) capable of forming a hollow electrode discharge area. See MPEM 2163.05, III. Range Limitation, *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Even though the range is narrowed, the appellant did not disclose the lower endpoint of the range of the opening width capable of forming a hollow electrode discharge to be 10 mm.

The lower endpoint of the range of the opening width for W(1) has been amended in the specification on page 35 and in claim 1 in an attempt to simply overcome the rejection of claims under 35 U.S.C. § 102. However, the disclosure in its entirety particularly the specification on page 48, lines 1-6, page 52, line 17 through page 54, line 11, page 98, lines 2-24, and Tables 2 and 3, teaches away from the lower endpoint of the range of the opening width W(1) being greater than 10 mm.

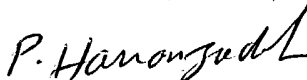
In brief, changing the lower endpoint of the range of the opening width W(1) from 1 mm to greater than 10 mm has no support in the disclosure as originally filed. In fact, the original disclosure teaches that the width of the opening capable of forming a hollow electrode discharge area can be as small as 1 mm depending on the frequency of the RF power source and the gas pressure (page 33, line 5 through page 35, line 22, page 48, lines 1-6, page 52, line 17 through page 54, line 11, page 98, lines 2-24, and Tables 2 and 3). Thus, the appellant did not have the possession of the lower endpoint of the range of the opening width W(1) being greater than 10 mm.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (571)272-1435. The examiner can normally be reached on Tuesday-Friday.

Art Unit: 1763

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571)272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Parviz Hassanzadeh
Primary Examiner
Art Unit 1763

October 25, 2004